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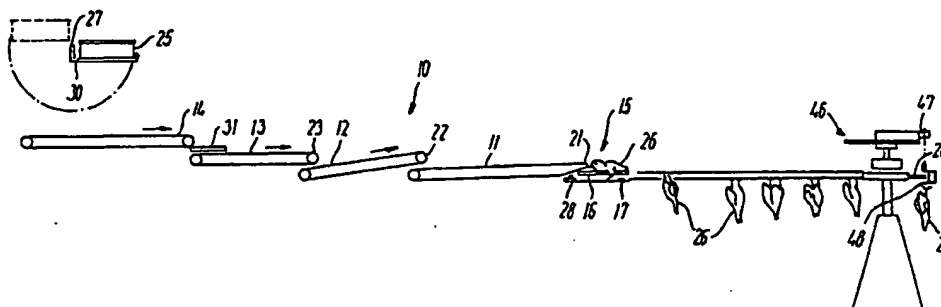
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## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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<p>(21) International Application Number: PCT/DK94/00083</p> <p>(22) International Filing Date: 28 February 1994 (28.02.94)</p> <p>(30) Priority Data: 0224/93 1 March 1993 (01.03.93) DK</p> <p>(71) Applicant (for all designated States except US): POUTECH A/S [DK/DK]; Olof Palmes Allé 26, DK-8200 Århus N (DK).</p> <p>(72) Inventors; and (75) Inventors/Applicants (for US only): NIELSEN, Holger, Hjort [DK/DK]; Bøgevej 3, DK-4070 Kirke Hyllinge (DK). SØRENSEN, Torben, Brandt [DK/DK]; Granvej 63, DK-5540 Ullerslev (DK). BRØDSGAARD, Ole [DK/DK]; Kogtvedparken 22, DK-5700 Svendborg (DK). JENSEN, Verner, Trygved [DK/DK]; Køllegårdsvej 13, DK-2730 Herlev (DK). KNUDSEN, Arne [DK/DK]; Egevangenget 27, DK-5771 Stenstrup (DK).</p> <p>(74) Agents: JØRGENSEN, Bjørn, Barker et al.; International Patent-Bureau, Høje Taastrup Boulevard 23, DK-2630 Taastrup (DK).</p>	<p>(81) Designated States: AT, AU, BB, BG, BR, BY, CA, CH, CN, CZ, DE, DK, ES, FI, GB, HU, JP, KG, KP, KR, KZ, LK, LU, LV, MD, MG, MN, MW, NL, NO, NZ, PL, PT, RO, RU, SD, SE, SK, TJ, UA, US, UZ, VN, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. In English translation (filed in Danish).</p>	

(54) Title: A METHOD FOR SUSPENDING LIVE POULTRY BY THE LEGS AND APPARATUS, CATCHING MEANS AND SHACKLE FOR CARRYING OUT THE METHOD



## (57) Abstract

By means of method live poultry, such as chickens (26) are made to stand up in a station (15), the beak directed in a desired direction, in that the poultry is passed at least once beyond the end (21, 22, 23) of a conveyor down into the station (15) in which a supporting means (16) for the abdomen of the poultry is provided. The legs of the poultry (26) may then be caught by means of a catching means (28) which after being turned so that the chicken is suspended with the head hanging downwards, is passed in over the retainer portion of a slaughter shackle (48) following which the poultry is released from the catching means (28) and its legs slide down into the retainer portion of the slaughter shackle (48).

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A METHOD FOR SUSPENDING LIVE POULTRY BY THE LEGS AND APPARATUS, CATCHING MEANS AND SHACKLE FOR CARRYING OUT THE METHOD.

The invention relates to a method of suspending live poultry, in particular chickens, by their legs, whereby the poultry is placed on a running conveyor to be passed onto a device for supporting the abdomen of the poultry following which the legs of the poultry are made to engage a catching means. Such a method is disclosed in WO 92/20233.

The invention further relates to an apparatus, a catching means and a slaughter shackle for use in carrying out the method according to the invention.

In the slaughtering of chickens these are generally delivered from the producer to the slaughterhouse in transportation boxes of a length and width so that they can be handled and a height corresponding to the height of a chicken. The chickens are placed closed together in the box in one layer. In the slaughterhouse the live chickens are suspended by their legs in so-called slaughter shackles suspended in a conveyor chain. By means of the conveyor chain the chickens are passed round in the slaughterhouse where they are killed defeathered, cleaned etc. The suspension of the live chickens is today frequently effected manually which is a monotonous and fatiguing work.

Several devices for automatic suspension of chickens are known. Thus, US-A-4 658 476 deals with an apparatus intended to ensure that chickens are correctly suspended in the slaughter shackles, i.e. the abdomen being directed in a determined direction. The apparatus includes a slide along which the chickens slide individually from a rotary table to a conveyor belt. Said reference states that the chickens drop a little from

the slide to the conveyor belt, which makes them stretch the legs so that they stand on the belt. The belt passes the chickens to a rail device which spreads their legs and the chickens are conveyed further forward to a catching means, catching and fastening the legs. The inventors of the present invention, however, has found that the chickens delivered to the slaughterhouse are frequently inclined to set immediately after they have been placed on an underlayer. With such chickens the apparatus according to the US-reference will not be able to operate as intended. Moreover, there are no means for safely orienting the chickens correctly on the conveyor belt.

EP-A-0 355 037 describes a manner in which chickens are made to stand up and an apparatus for carrying out the method. According to the EP-reference the chickens are conveyed on a conveyor belt across a nozzle which sprays e.g. water on the abdomen of the chicken which makes them get up, so that it is possible to grip their legs by means of catching shackles. Said EP-reference, however, does not say anything about how to ensure that the chickens assume a correct position for catching.

The object of the invention is to provide a method of suspending live poultry, in particular chickens, by their legs, ensuring that the chickens in a manner gentle to them may be brought from a position standing or sitting on a conveyor belt to a position suspended in slaughter shackles by their legs.

The object is fulfilled by means of a method characterized in that the poultry is passed beyond the downstream end of the conveyor and for instance via a corresponding conveyor, on which it is also passed beyond the downstream end, down onto the supporting means, that the legs of the poultry are caught by means of the catching means, that the catching means is moved

in relation to the supporting means, that the catching means is turned so that the poultry is suspended in its legs, the head facing downwards, that the catching means with the downwards suspended poultry is passed in over  
5 the retaining part of a slaughter shackle and that the poultry is released from the catching means, whereby its legs slide down in the retaining part of the slaughter shackle.

The inventors has found that a chicken when passed  
10 beyond the end of a conveyor, e.g. a belt conveyor, will attempt to remain on the conveyor and doing so, it turns to have its tail in the conveying direction. By running the conveyor at a suitable speed the chicken will in spite of its attempt be passed beyond the end of the  
15 conveyor and drop down onto the supporting means. The chicken lands with its abdomen towards the supporting means and the legs suspended downwards, following which they may be caught by means of the catching shackle for subsequent transfer to the slaughter shackle.

20 An apparatus according to the invention for use in carrying out the method and comprising a running conveyor with a downstream end is characterized in that below the downstream end there is a station in which a supporting means is provided for the abdomen of the  
25 poultry, said supporting means extending substantially horizontally in the longitudinal direction of the conveyor and substantially centrally in relation to the longitudinal centre plane of the conveyor and that catching means are provided at said station below the  
30 supporting means for catching the legs of a piece of poultry. With this apparatus and its arrangement of the supporting means, a chicken will land with its abdomen against the supporting means and the legs suspended downwards on either side of the supporting means for  
35 catching by means of the catching shackle.

In an embodiment of the apparatus there are provided lateral guide plates at the downstream end of the conveyor to form a funnel with a discharge opening corresponding in size to the width of a piece of poultry 5 and placed substantially centrally in relation to said supporting means. It is thereby ensured to a higher degree that the chickens actually land having a leg on either side of the supporting means.

In a further embodiment of the apparatus there is 10 provided beneath the supporting means a treading surface for the poultry. The position of the chicken's feet is thereby further ensured when the chicken is in the station to be gripped round the legs.

In a further embodiment the means for catching the 15 legs of a piece of poultry includes a catching means adapted to be passed towards the legs of the poultry from the front or from the side when the poultry is in the intended position in the station. This is advantageous, the inventors having experimented that a chicken 20 if its legs is touched from the front or from the side scarcely reacts. It is thus possible with this embodiment to grip the legs of the chicken in a relatively quiet movement.

In an apparatus for use in the carrying out of the 25 method according to the invention a conveyor is divided into more subconveyors so that the downstream end of an upstream subconveyor is located above the following subconveyor at its upstream end. As previously mentioned, the chickens are inclined to rotate in an attempt to 30 remain on the conveyor when passed beyond the end of a conveyor. The chickens may be passed several times beyond a conveyor end; thereby obtaining more safety that all chickens have rotated correctly upon reaching a collection station.

According to an embodiment of the method according to the invention the poultry is placed on the conveyor in that an upwards open transportation box containing poultry is suspended above a face following which the transportation box is swung away beneath the poultry about a substantially horizontal axis, whereby the poultry drops down on the face, following which the poultry is passed from the face to the conveyor, or the face is constituted by part of the conveyor.

10 An apparatus for carrying out this embodiment of the method includes a carrying device for a transportation box with a substantially horizontal axis of rotation, a releasable retaining device for holding a transportation box supported by the carrying device for  
15 pivoting the transportation box downwards about the axis of rotation. In a further embodiment the apparatus includes a running conveyor beneath the carrying device. The downstream end of said conveyor is positioned above a second conveyor at the upstream end thereof, and in  
20 relation to each other the two conveyors are relatively wide and relatively narrow, respectively. With this embodiment of the apparatus according to the invention the chickens may be passed from a transportation box on to a wide face and from there further to a narrow face  
25 so that they may be advanced on the narrow face centrally in relation to the station in which they are later on placed to be caught by the legs and suspended.

A catching means for use in carrying out the method according to the invention is characterized by comprising a flat portion with two lateral inwardly converging  
30 openings each associated to a bottom part with substantially parallel lateral edges and a bottom edge, that one lateral edge and/or the bottom edge of each bottom part is releasable so as to be movable after  
35 release away from the other edges, and that said portion



is pivotal about a substantially horizontal axis. With such a catching means a chicken maybe caught by the legs by preferably passing the flat portion from the front towards the legs of the chicken, so that the legs are  
5 passed into their respective opening and further into their respective bottom portion. When the bottom reaches the legs of the chicken, the legs are thus caught and the further movement of the flat portion moves the legs and the chicken away from the supporting means and the  
10 station. Then, the flat portion together with the chicken may rotate about the horizontal axis so that the chicken will be suspended with the head downwards. Thereafter the chicken may together with the catching means be passed to a desired position and be let off by  
15 releasing one lateral edge or the bottom edge of the bottom parts.

A slaughter shackle for use in carrying out the method and comprising an upper portion adapted to be suspended, for instance in a conveyor or chain, and a  
20 lower portion having two vertical upwards opening and downwards closed slits is according to the invention characterized in that the part of the slaughter shackle which includes the slits upwardly extends out from a plane of the slaughter shackle that is vertical in use,  
25 and that the slits are open vertically upwardly from said portion such a design of the slaughter shackle makes it possible to pass a catching means with a downwards suspended chicken in over that part of the slaughter shackle which includes the slits whereby the  
30 chicken upon release of the catching means, will slide down into the slits with its legs and be firmly held by the feet.

The invention will now be explained in detail by means of examples with reference to the schematical  
35 drawings, in which

Fig. 1 shows the apparatus according to the invention, comprising a subdivided first conveyor,

Fig. 2 is a view corresponding to Fig. 1, but viewed from above,

5 Fig. 3 is a section along the line III-III in Fig. 2,

Fig. 4 is a side view of the chicken in Fig. 3,

Fig. 5 is a view of the chicken in Fig. 4, viewed from below together with a catching shackle,

10 Fig. 6 is a sectional view of a catching means according to the invention, viewed from above,

Fig. 7 is a slaughter shackle according to the invention, viewed from the side, and

15 Fig. 8 illustrates the slaughter shackle according to the invention, viewed from the front.

Figs. 1 and 2 show an apparatus comprising a first conveyor 10, divided into three subconveyors 11, 12 and 13. In the illustrated example said subconveyors are all belt conveyors and their direction of conveyance is from the left to the right, viewed in Figs 1 and 2. At the downstream end of the subconveyor 11 there is provided a collection station 15 with a supporting means which in the example is constituted by a stick 16 extending substantially horizontally in the longitudinal direction of the first conveyor in relation thereto and a distance below the level of the subconveyor 11 at the downstream end. The collector station 15, moreover includes a table 17 and lateral guide plates 18 and 19 which for the sake of clearness are not shown in Fig. 1.

30 The belts of the subconveyors 11, 12 and 13 are passed over rolls of which rolls 21, 22, 23 at the downstream ends of subconveyors 11, 12, 13, respectively, have diameters D1, D2 and D3. As it appears from Fig. 1 the subconveyors 11, 12, 13 overlap each other  
35 so that an object advanced on the subconveyor 13, will

be passed beyond the end at the roll and fall down onto the subconveyor 12, similarly, as regards the transition from the subconveyor 12 to the subconveyor 11 and, likewise, as regards the transition from the subconveyor 5 12 to the subconveyor 11 per se similarly as regards the transition from the second conveyor 14 to the subconveyor 13.

To the left in Figs. 1 and 2 a receiver conveyor 14 with larger width than the first conveyor 10. A 10 transportation box 25 placed in a suspension 30 with a horizontal axis of rotation 27 is shown in Fig. 1 above the receiver conveyor. Chickens arrived from a producer in the transportation box 25 are in the illustrated example transferred to the receiver conveyor 14 by 15 rotating the transportation box with the device 30 about the axis 27 to the position shown in dashed lines. The rotation is effected quickly by means of a means not shown, so that the chickens substantially take a free fall down onto the receiver conveyor 14.

20 From the receiver conveyor 14 the chickens are passed on to an intermediate conveyor 31 extending below the downstream edge of the receiver conveyor 14 so that the chickens placed as a herd on the receiver conveyor 14 by means of the intermediate conveyor are passed 25 individually to the first conveyor 10, the downstream edge of the intermediate conveyor 31 being positioned above the subconveyor 13 of the first conveyor 10 at the upstream end thereof.

When a chicken is passed from one conveyor to 30 another and thus drops down a little, as is the case with the present apparatus, they will when passed beyond the end of a conveyor, try to remain on the conveyor. In their attempt they will turn their bill facing away from the direction of conveyance. It is this effect 35 which according to the invention is utilized to make the

chickens turn to face a determined direction. When the chickens from the receiver conveyor fall down onto the intermediate conveyor 31, whether or not they have had time to turn, they will sense the transverse movement of the intermediate conveyor, that is transverse in relation to the receiver conveyor, and they will probably attempt to counteract this movement and thereby turn round, their bill directed opposite to the direction of transportation of the intermediate conveyor. This will be repeated at the transition from the intermediate conveyor 31 to the subconveyor 13.

It is the experience of the inventors that the chickens after they have landed on a conveyor will quickly sit down. It varies from race to race and from chicken to chicken how quickly the chickens sit down.

The transition from the subconveyor 13 to the subconveyor 11 will make the chickens which do not already face their tail in the direction of conveyance turn to do so.

It has turned out that there is some connection between the speed of the belts of the subconveyors 11, 12, 13, the diameters of the rolls 21, 22, 23 and the temper of the race of the chickens in treatment to be taken into consideration in order to obtain the desired and described effect.

In successful experiments carried out by the inventors there was used a speed of 0.1-1 m/s with diameters D2 and D3 in the interval about 5 to 30 cm, whereas a speed in the interval about 3 to 20 cm was used for the subconveyor 11.

When the chickens arrive to the collection station 15, they will by guide plates 18 and 19 be passed to a position as shown in Fig. 3, showing a chicken standing with its bill facing the subconveyor 11, the legs straddling over the stick 16, the feet standing on the

table 17. The stick 16 prevents the chicken from sitting on the table 17 and the legs are therefore accessible to be gripped by means of a catching means.

Figs. 4 and 5 illustrate the same situation as Fig. 3, but from other angles, various parts being deleted for the sake of clearness. A catching means 28 only schematically shown in Figs. 4 and 5 is moved from a position in front of the chicken backwards in relation thereto to the position shown in dashed line by the arrows 29 in Fig. 5, in which the catching means 28 has gripped the legs of the chicken.

Fig. 6 shows the catching means 28 viewed from above. The catching means 28 includes a shackle 33 with four branches 33a, 33b, 33c and 33d, which are substantially designed as a W or as two adherent Y's.

The shackle 33 thus forms two openings 34 adjoining a bottom part 35. As it appears from the drawings the parts 36 of the shackle 33 that define the bottom part 35 are substantially parallel and their mutual distance is determined so that they can grip between them and retain the leg of a chicken. In the illustrated example the shackle is at one end suspended in a mechanism 37 with a horizontal axis of rotation 38. The branches of the shackle 33 are interconnected so that the branch 33a is hinged to the branch 33c and the branch 33b is hinged to the branch 33d and the branch 33c, respectively. Moreover, the branch 33a at the bottom parts 35 may slide in relation to the branch 33d, as shown by the double arrow 50, and the mechanism 37 is arranged to control this sliding.

It will be recognized that sliding away of the branch 33a from the branch 33d, will cause the distance between the parts 36 of the right and the left side, respectively, of the W to increase and vice versa.

Figs. 7 and 8 show a slaughter shackle 48 including a top portion with an eye 39 for suspension e.g. in a chain conveyor. The top portion is integral with a lower position which like the top portion may be made from 5 round steel, that is general as regards current slaughter shackles. The lower portion includes two side members 41 which extend a distance substantially perpendicularly from the general plane BB of the slaughter shackle and after a bend incline downwards 10 towards a bottom member 42. An intermediate member 43 which as it appears from Fig. 7 extends in the same face as the side members 41 and which as it appears from Fig. 8 is substantially U-shaped is fixed on the bottom member 42 between the side members 41, in order to form 15 together with the side members 41 two slits 44 of such a width that they can receive and retain the legs of a chicken so as is known from current slaughter shackles.

The catching means and the slaughter shackle according to the invention are used as shown to the 20 right in Figs. 1 and 2. The catching means 28 are advanced in a path as shown by the arrow 45 so as to successively catch a chicken in the station as described with reference to Figs. 3 to 5. After a chicken has been caught by its legs, the catching means 28 is moved 25 further, and in drawing the chicken out of the collector station 15, the chicken falls forwards, the catching means 28 swinging around its axis of rotation 38, the chicken is made to be suspended with its head downwards. Then the catching means and the chicken are rotated so 30 that the chicken is advanced sidewise. The catching means is passed further onto a wheel arrangement 46 where it joins a slaughter shackle suspended in a chain conveyor 47. The catching means 28 is thereby held in over the horizontal upper part of the side members 41 35 of the slaughter shackle. The chicken will thus hang in

the catching means 28 having its legs extending through the slits 44 of the slaughter shackle 48. At this moment the branches 33a and 33d of the catching means' 28 shackle are allowed to slide from each other and the 5 chicken is thus released from the catching means 28 and falls a little, its feet being caught by the slits 44 in slaughter shackle 48. The chicken is so transferred to the slaughter shackle.

## P A T E N T   C L A I M S

1. A method of suspending live poultry in particular chickens, by their legs, whereby the poultry is placed on a running conveyor (10) to be passed to a supporting means (16) for the abdomen of the poultry, following which the legs of the poultry are made to engage a catching means (28), characterized in that the poultry is passed beyond and the downstream end (23) of the conveyors and, for instance via a corresponding conveyor (13, 12, 11) where it is also passed beyond the downstream end (23, 22, 21), down onto the supporting means (16), that the legs of the poultry are caught by means of the catching means (28), that the catching means is moved in relation to the supporting means (16), that the catching means (28) is turned so that the poultry is suspended by the legs, the head facing downward, that the catching means (28) with the downwards suspended poultry is passed in over the retaining part of a slaughter shackle (48), and that the poultry is released from the catching means, whereby its legs slide down into the retaining part of the slaughter shackle.

2. A method according to claim 1, characterized in that the poultry is placed on the conveyor in that an upwards open transportation box (25) containing poultry is suspended over a face (14), that the transportation box (25) is swung away below the poultry about a substantially horizontal axis (27), whereby the poultry falls down on the face, and that the poultry is passed from the face to the conveyor, or the face is constituted by part of the conveyor.

3. An apparatus for use in carrying out the method according to claim 2, characterized in that it includes several successive conveyors (11, 12, 13) designed so that the downstream end (22, 23) of an upstream conveyor



(12, 13) is located above the following conveyor (11, 12) at its upstream end.

4. An apparatus for use in carrying out the method according to claim 1, comprising a running conveyor (10) with a downstream end (21), characterized in that a station (15) is arranged beneath the downstream end (21) in which station a supporting means (16) is provided for the abdomen of the poultry, said supporting means extending substantially horizontally in the longitudinal direction of the conveyor and substantially centrally in relation to the longitudinal centre plane of the conveyor (10), and that means (28) are arranged below the supporting means (16) for catching the legs of a piece of poultry.

5. An apparatus as claimed in claim 4, characterized in that lateral guide plates (18, 19) are provided at the downstream end (21) of the conveyor (10) for forming a funnel with a discharging opening corresponding in size to the width of a piece of poultry and positioned substantially centrally in relation to the supporting means (16).

6. An apparatus according to claim 4 or 5, characterized in that the means for catching the legs of a piece of poultry include a catching means (28) intended to be passed towards the legs of the poultry from the front or from the side.

7. An apparatus according to claims 4 to 6, characterized in that a tread plate (17) for the poultry is arranged below the supporting means (16).

8. A catching means for use in carrying out the method according to claim 1, characterized in that it includes a flat position with two lateral inwardly converging openings (34), each associated to a bottom part (35) with substantially parallel side edges and a bottom edge, that one side edge (36) and/or the bottom

edge of each part is releasably in order to be movable after release away from the other side edges, and that said portion is pivotal about a substantially horizontal axis (38).

5        9. A slaughter shackle for use in carrying out the method according to claim 1, comprising an upper part adapted to be suspended, e.g. in a chain conveyor, and a lower part comprising two lateral, upwards open and downwards closed slits (44), characterized in that the  
10 part (41,43) of the slaughter shackle including the slits upwardly extends out from a plane (BB) of the slaughter shackle that is vertical in use, and that the slits (44) are open vertically upwards from said part.

10. An apparatus for use in carrying out the method  
15 according to claim 2, characterized in that it comprises a supporting device (30) for a transportation box (25) with a substantially horizontal axis of rotation (27), a releasable retainer device for retaining a transportation box supported by the supporting device substantially horizontally, and a power device for pivoting the  
20 transportation box downwards about the axis of rotation.

11. An apparatus according to claim 10, characterized in that it comprises a running conveyor (14) beneath the supporting device (30), that the downstream  
25 end of said conveyor is located above another conveyor at its upstream end, and that the two conveyors in relation to each other are relatively broad and relatively narrow, respectively.

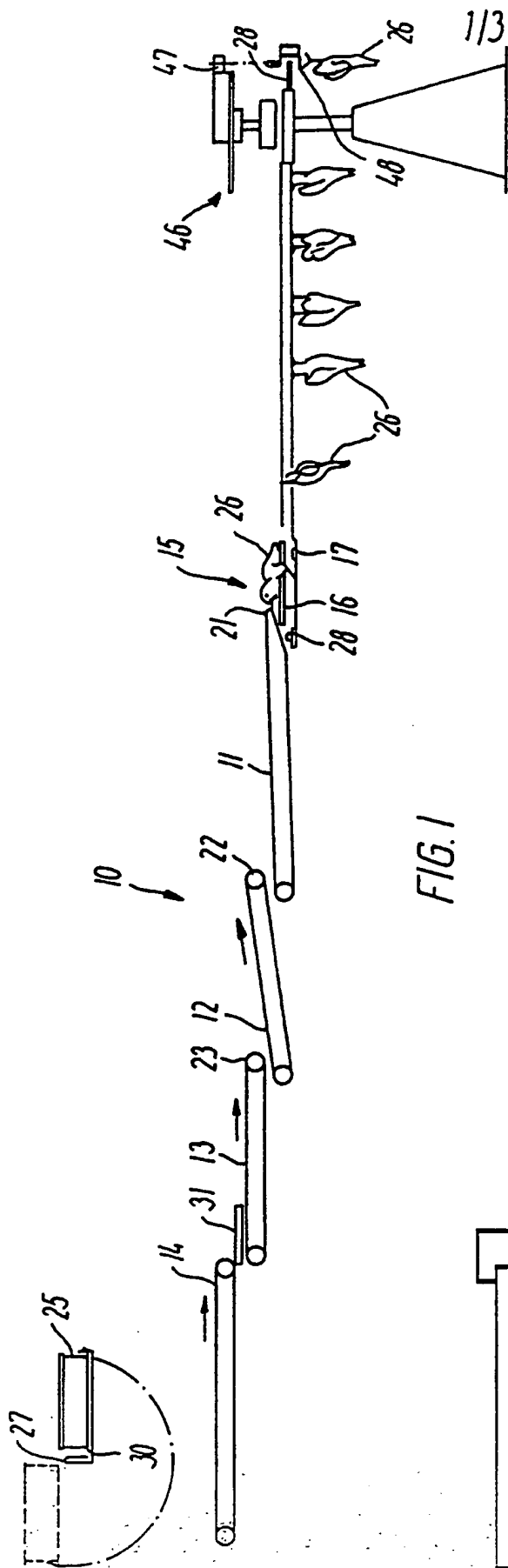


FIG. 1

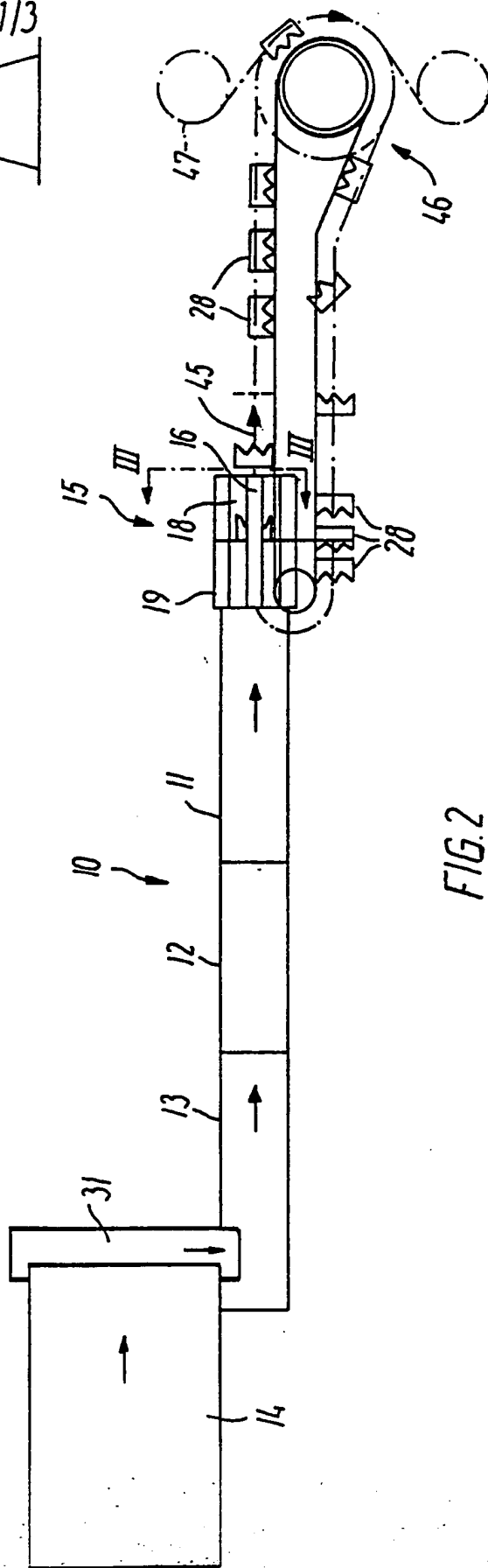


FIG. 2

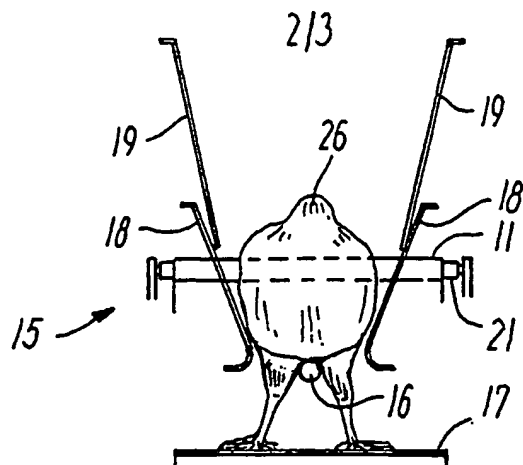


FIG. 3

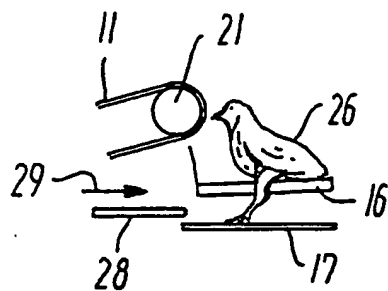


FIG. 4

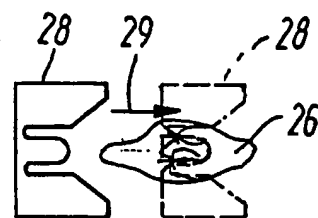


FIG. 5

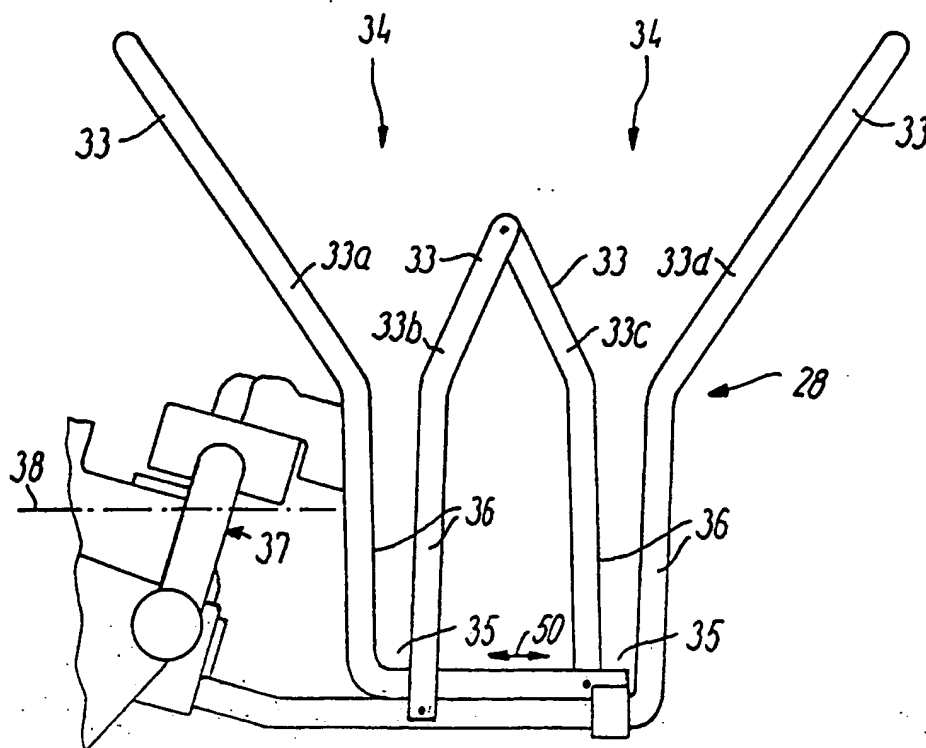
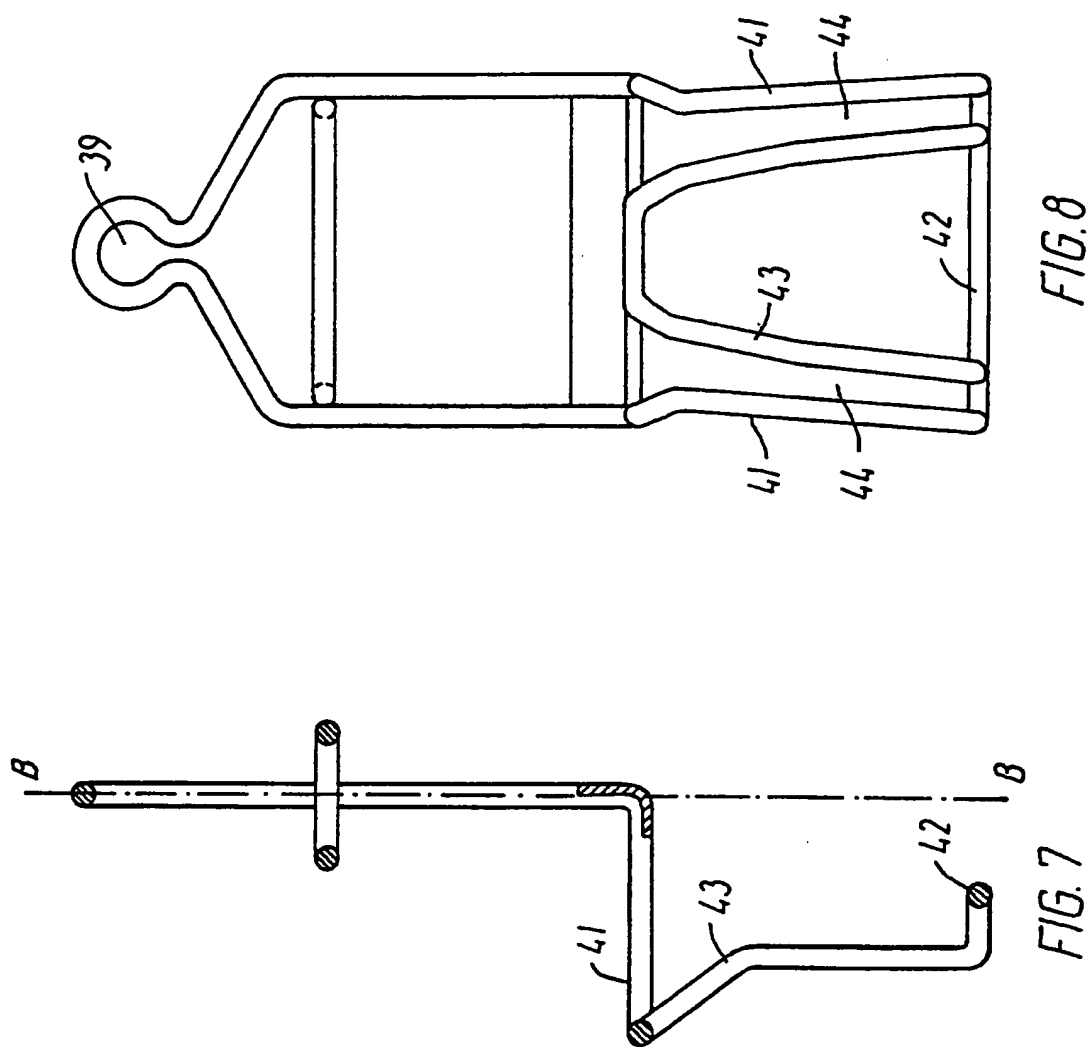


FIG. 6

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## INTERNATIONAL SEARCH REPORT

International application No.

PCT/DK 94/00083

## A. CLASSIFICATION OF SUBJECT MATTER

IPC : A22B 1/00, A01K 45/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC : A22B, A22C, A01K

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO, A1, 9220223 (BRITISH TECHNOLOGY GROUP LTD), 26 November 1992 (26.11.92), page 5, line 22 - line 23; page 6, line 21 - line 24 --	1
X	US, A, 4380969 (THOMAS), 26 April 1983 (26.04.83), figure 3, claims 1-11 --	2-11
X	US, A, 3741417 (BLANKENSHIP), 26 June 1973 (26.06.73), figure 2, claims 1-5 -----	2-11

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